

Amendment and Response

Page 2 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING
COMPLEXING AGENTS**Amendments to the Claims**

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

Listing of Claims

1. **(Previously Presented)** A planarization method comprising:
 positioning a Group VIII metal-containing surface of a substrate to interface with
 a polishing surface, wherein the Group VIII metal is selected from the group of rhodium,
 iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;
 supplying a planarization composition in proximity to the interface; and
 planarizing the Group VIII metal-containing surface;
 wherein the planarization composition comprises a complexing agent selected
 from the group of a cyclic diene, an organic amine, and combinations thereof; and
 wherein the organic amine is selected from the group consisting of ethylamine,
 methylamine, triethylamine, trimethylamine, and combinations thereof.
2. **(Original)** The method of claim 1 wherein the Group VIII metal is present in an amount
of about 50 atomic percent or more.
3. **(Original)** The method of claim 2 wherein the Group VIII metal-containing
surface of the substrate comprises a Group VIII metal in elemental form or an alloy
thereof.
4. **(Original)** The method of claim 3 wherein the Group VIII metal-containing surface
comprises elemental platinum or a platinum alloy.

Amendment and Response

Page 3 of 25

Serial No.: 10/028.040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

5. (Original) The method of claim 4 wherein the Group VIII metal-containing surface comprises elemental platinum.
6. (Currently Amended) A planarization method comprising:
positioning a Group VIII metal-containing surface of a substrate to interface with a polishing surface, wherein the Group VIII metal is selected from the group of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;
supplying a planarization composition in proximity to the interface;
planarizing the Group VIII metal-containing surface;
wherein the planarization composition comprises about 0.1 wt-% to about 10 wt-% of a complexing agent selected from the group of a cyclic diene, an organic amine, and combinations thereof; [[and]]
wherein the planarization composition further comprises an oxidizing agent; and
wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.
7. (Original) The method of claim 6 wherein the oxidizing agent is selected from the group consisting of a peroxide, a nitrate, a permanganate, and a combination thereof.
8. (Original) The method of claim 1 wherein the polishing surface comprises a polishing pad and the planarization composition comprises a plurality of abrasive particles.
9. (Original) The method of claim 1 wherein the planarization composition comprises a plurality of abrasive particles having a hardness of no greater than about 9 Mohs.
10. (Original) The method of claim 9 wherein the plurality of abrasive particles comprise CeO_2 , Al_2O_3 , SiO_2 , or combinations thereof.

Amendment and Response

Page 4 of 25

Serial No.: 10/028.040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

11. (Original) The method of claim 1 wherein the substrate is a semiconductor substrate or substrate assembly.

12. (Original) The method of claim 1 wherein the Group VIII metal-containing surface is removed relative to an oxide layer at a selectivity ratio of at least about 10:1.

13. (Original) The method of claim 1 wherein the cyclic diene is selected from the group consisting of 1,5-cyclooctadiene (COD), 1,5-dimethyl-1,5-cyclooctadiene, and a combination thereof.

14. (Canceled)

14 15. (Original) The method of claim 1 wherein the polishing surface comprises a fixed abrasive article.

15 16. (Previously Presented) A planarization method comprising:
positioning a Group VIII metal-containing surface of a substrate to interface with a polishing surface, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;
supplying a planarization composition in proximity to the interface; and
planarizing the Group VIII metal-containing surface;
wherein the planarization composition comprises an organic amine and an organic chelating acid or salt thereof; and
wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

Amendment and Response

Page 5 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING
COMPLEXING AGENTS

16¹⁷ (Original) The method of claim 16 wherein the Group VIII metal is present in an amount of about 50 atomic percent or more.

17¹⁸ (Original) The method of claim 16 wherein the Group VIII metal-containing surface comprises elemental platinum.

18¹⁹ (Original) The method of claim 16 wherein the planarization composition further comprises an oxidizing agent.

19²⁰ (Original) The method of claim 19 wherein the oxidizing agent is selected from the group consisting of a peroxide, a nitrate, a permanganate, and a combination thereof.

20²¹ (Original) The method of claim 16 wherein the polishing surface comprises a polishing pad and the planarization composition comprises a plurality of abrasive particles.

21²² (Original) The method of claim 16 wherein the planarization composition comprises a plurality of abrasive particles having a hardness of no greater than about 9 Mohs.

22²³ (Original) The method of claim 22 wherein the plurality of abrasive particles comprise CeO_2 , Al_2O_3 , SiO_2 , or combinations thereof.

23²⁴ (Original) The method of claim 16 wherein the substrate is a semiconductor substrate or substrate assembly.

24²⁵ (Original) The method of claim 16 wherein the organic chelating acid is selected from the group consisting of acetic acid, ascorbic acid, citric acid, propenoic acid, tartaric acid, succinic acid, and combinations thereof.

Amendment and Response

Page 6 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING
COMPLEXING AGENTS

26. (Canceled)

25 27. (Original) The method of claim 16 wherein the polishing surface comprises a fixed abrasive article.

26 28. (Currently Amended) A planarization method comprising:
positioning a Group VIII metal-containing surface of a substrate to interface with a polishing surface, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;
supplying a planarization composition in proximity to the interface; and
planarizing the Group VIII metal-containing surface;
wherein the planarization composition comprises a plurality of abrasive particles and a complexing agent; and further wherein a majority of the plurality of abrasive particles are CeO₂ abrasive particles;
wherein the complexing agent is selected from the group consisting of an organic chelating acid, an organic amine, a cyclic diene, and combinations thereof; and
wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

27 29. (Original) The method of claim 28 wherein the Group VIII metal is present in an amount of about 50 atomic percent or more.

28 30. (Original) The method of claim 28 wherein the Group VIII metal-containing surface comprises elemental ruthenium.

29 31. (Original) The method of claim 28 wherein the planarization composition further comprises an oxidizing agent.

Amendment and Response

Page 7 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

32. (Canceled)

30 33. (Previously Presented) The method of claim 28 wherein the organic chelating acid is selected from the group consisting of acetic acid, ascorbic acid, citric acid, propenoic acid, tartaric acid, succinic acid, and combinations thereof.

34. (Canceled)

31 35. (Previously Presented) The method of claim 28 wherein the cyclic diene is selected from the group consisting of 1,5-cyclooctadiene (COD), 1,5-dimethyl-1,5-cyclooctadiene, and a combination thereof.

3 36. (Original) The method of claim 28 wherein the polishing surface comprises a polishing pad.

37 37. (Currently Amended) A planarization method comprising:
positioning a Group VIII metal-containing surface of a substrate to interface with a polishing surface, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;
supplying a planarization composition in proximity to the interface; and
planarizing the Group VIII metal-containing surface;
wherein the planarization composition comprises a complexing agent selected from the group consisting of a cyclic diene, ethylamine, methylamine, triethylamine, trimethylamine, acetic acid, ascorbic acid, propenoic acid, succinic acid, salts of [[the]]acetic, ascorbic, propenoic, or succinic acids, and combinations thereof; and
further wherein the method is carried out in one step.

Amendment and Response

Page 8 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

34 38. (Currently Amended) A planarization method comprising:

positioning a Group VIII metal-containing surface of a substrate to interface with a polishing surface, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;

supplying a planarization composition in proximity to the interface;

planarizing the Group VIII metal-containing surface;

wherein the planarization composition comprises about 0.1 wt-% to about 10 wt-% of a complexing agent selected from the group consisting of a cyclic dicene, an organic amine, ~~an organic chelating acid,~~ and combinations thereof;

further wherein the method is carried out in one step; [[and]]

wherein the planarization composition further comprises an oxidizing agent; and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

35 39. (Previously Presented) A planarization method comprising:

providing a semiconductor substrate or substrate assembly including at least one region of a platinum-containing surface;

providing a polishing surface;

providing a planarization composition at an interface between the at least one region of platinum-containing surface and the polishing surface;

and

planarizing the at least one region of platinum-containing surface;

wherein the planarization composition comprises a complexing agent selected from the group consisting of a cyclic diene, an organic amine, and combinations thereof;

and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

Amendment and Response

Page 9 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

36 40.

(Currently Amended) A planarization method comprising:

- providing a semiconductor substrate or substrate assembly including at least one region of a platinum-containing surface;
 - providing a polishing surface;
 - providing a planarization composition at an interface between the at least one region of platinum-containing surface and the polishing surface; and
 - planarizing the at least one region of platinum-containing surface;
- wherein the planarization composition comprises about 0.1 wt-% to about 10 wt-% of a complexing agent selected from the group consisting of a cyclic diene, an organic amine, and combinations thereof; [[and]]
- wherein the planarization composition further comprises an oxidizing agent; and
- wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

37 AT.

(Previously Presented) A planarization method comprising:

- providing a semiconductor substrate or substrate assembly including at least one region of a platinum-containing surface;
 - providing a polishing surface;
 - providing a planarization composition at an interface between the at least one region of platinum-containing surface and the polishing surface;
 - and
 - planarizing the at least one region of platinum-containing surface;
- wherein the planarization composition comprises an organic amine and an organic chelating acid or salt thereof; and
- wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

Amendment and Response

Page 10 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

38 42. (Original) The method of claim 41 wherein the planarization composition further comprises an oxidizing agent.

39 43. (Currently Amended) A planarization method comprising:

- providing a semiconductor substrate assembly including at least one region of a platinum-containing surface;
- providing a polishing surface;
- providing a planarization composition at an interface between the at least one region of platinum-containing surface and the polishing surface;
- and
- planarizing the at least one region of platinum-containing surface;

wherein the planarization composition comprises a plurality of abrasive particles and a complexing agent; and

further wherein a majority of the plurality of abrasive particles are CeO₂ abrasive particles;

wherein the complexing agent is selected from the group consisting of ~~an organic chelating acid~~, an organic amine, a cyclic diene, and combinations thereof; and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

40 44. (Original) The method of claim 43 wherein the planarization composition further comprises an oxidizing agent.

41 45. (Original) The method of claim 43 wherein the polishing surface comprises a polishing pad.

42 46. (Currently Amended) A planarization method comprising:

Amendment and Response

Page 11 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

providing a semiconductor substrate or substrate assembly including at least one region of a platinum-containing surface;
providing a polishing surface;
providing a planarization composition at an interface between the at least one region of platinum-containing surface and the polishing surface; and
planarizing the at least one region of platinum-containing surface;
wherein the planarization composition comprises a complexing agent selected from the group consisting of a cyclic diene, ethylamine, methylamine, triethylamine, trimethylamine, acetic acid, ascorbic acid, propenoic acid, succinic acid, salts of [[the]]acetic, ascorbic, propenoic, or succinic acids, and combinations thereof; and
further wherein the method is carried out in one step.

42 47.

(Currently Amended) A planarization method comprising:

providing a semiconductor substrate or substrate assembly including at least one region of a platinum-containing surface;
providing a polishing surface;
providing a planarization composition at an interface between the at least one region of platinum-containing surface and the polishing surface; and
planarizing the at least one region of platinum-containing surface;
wherein the planarization composition comprises about 0.1 wt-% to about 10 wt-% of a complexing agent selected from the group consisting of a cyclic diene, an organic amine, ~~an organic chelating acid~~, and combinations thereof;
further wherein the method is carried out in one step; [[and]]
wherein the planarization composition further comprises an oxidizing agent; and
wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

Amendment and Response

Page 12 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING
COMPLEXING AGENTS

414-48. (Previously Presented) A planarization method for use in forming a capacitor or barrier layer, the method comprising:

providing a semiconductor substrate or substrate assembly having a patterned dielectric layer formed thereon and a Group VIII metal-containing layer formed over the patterned dielectric layer, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;

positioning a first portion of a polishing surface for contact with the Group VIII metal-containing layer;

providing a planarization composition in proximity to the contact between the polishing surface and the Group VIII metal-containing layer; and

planarizing the Group VIII metal-containing layer;

wherein the planarization composition comprises a complexing agent selected from the group consisting of a cyclic diene, an organic amine, and combinations thereof; and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

45-49. (Currently Amended) A planarization method for use in forming a capacitor or barrier layer, the method comprising:

providing a semiconductor substrate or substrate assembly having a patterned dielectric layer formed thereon and a Group VIII metal-containing layer formed over the patterned dielectric layer, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;

positioning a first portion of a polishing surface for contact with the Group VIII metal-containing layer;

Amendment and Response

Page 13 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

providing a planarization composition in proximity to the contact between the polishing surface and the Group VIII metal-containing layer; and
planarizing the Group VIII metal-containing layer;
wherein the planarization composition comprises about 0.1 wt-% to about 10 wt-% of a complexing agent selected from the group consisting of a cyclic diene, an organic amine, and combinations thereof; ~~[[and]]~~
wherein the planarization composition further comprises an oxidizing agent; and
wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

4 6 50. (Previously Presented) A planarization method for use in forming a capacitor or barrier layer, the method comprising:

providing a semiconductor substrate or substrate assembly having a patterned dielectric layer formed thereon and a Group VIII metal-containing layer formed over the patterned dielectric layer, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;

positioning a first portion of a polishing surface for contact with the Group VIII metal-containing layer;

providing a planarization composition in proximity to the contact between the polishing surface and the Group VIII metal-containing layer;

and

planarizing the Group VIII metal-containing layer;

wherein the planarization composition comprises an organic amine and an organic chelating acid or salt thereof; and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

Amendment and Response

Page 14 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

47-51. (Original) The method of claim 50 wherein the planarization composition further comprises an oxidizing agent.

48-52. (Currently Amended) A planarization method for use in forming a capacitor or barrier layer, the method comprising:

providing a semiconductor substrate or substrate assembly having a patterned dielectric layer formed thereon and a Group VIII metal-containing layer formed over the patterned dielectric layer, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;

positioning a first portion of a polishing surface for contact with the Group VIII metal-containing layer;

providing a planarization composition in proximity to the contact between the polishing surface and the Group VIII metal-containing layer;

and

planarizing the Group VIII metal-containing layer;

wherein the planarization composition comprises a plurality of abrasive particles and a complexing agent;

further wherein a majority of the plurality of abrasive particles are CeO₂ abrasive particles;

wherein the complexing agent is selected from the group consisting of ~~an organic chelating acid~~, an organic amine, a cyclic diene, and combinations thereof; and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

49-53. (Original) The method of claim 52 wherein the planarization composition further comprises an oxidizing agent.

Amendment and Response

Page 15 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

54. (Original) The method of claim 52 wherein the polishing surface comprises a polishing pad.

55. (Currently Amended) A planarization method for use in forming a capacitor or barrier layer, the method comprising:

providing a semiconductor substrate or substrate assembly having a patterned dielectric layer formed thereon and a Group VIII metal-containing layer formed over the patterned dielectric layer, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;

positioning a first portion of a polishing surface for contact with the Group VIII metal-containing layer;

providing a planarization composition in proximity to the contact between the polishing surface and the Group VIII metal-containing layer;

and

planarizing the Group VIII metal-containing layer;

wherein the planarization composition comprises a complexing agent selected from the group consisting of a cyclic diene, ethylamine, methylamine, triethylamine, trimethylamine, acetic acid, ascorbic acid, propenoic acid, succinic acid, salts of [(the)]acetic, ascorbic, propenoic, or succinic acids, and combinations thereof; and

further wherein the method is carried out in one step.

56. (Currently Amended) A planarization method for use in forming a capacitor or barrier layer, the method comprising:

providing a semiconductor substrate or substrate assembly having a patterned dielectric layer formed thereon and a Group VIII metal-containing layer formed over the patterned dielectric layer, wherein the Group VIII metal is selected from the group

Amendment and Response

Page 16 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;

positioning a first portion of a polishing surface for contact with the Group VIII metal-containing layer;

providing a planarization composition in proximity to the contact between the polishing surface and the Group VIII metal-containing layer; and

planarizing the Group VIII metal-containing layer;

wherein the planarization composition comprises about 0.1 wt-% to about 10 wt-% of a complexing agent selected from the group consisting of a cyclic diene, an organic amine, ~~an organic chelating acid,~~ and combinations thereof;

further wherein the method is carried out in one step; [[and]]

wherein the planarization composition further comprises an oxidizing agent; and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

57. (Original) The method of claim 55 wherein the polishing surface comprises a polishing pad.

58. (Original) The method of claim 55 wherein the polishing surface comprises a fixed abrasive article.

59. (Currently Amended) A planarization method comprising:
positioning a Group VIII metal-containing surface of a substrate to interface with a polishing surface, wherein the Group VIII metal is selected from the group of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;
supplying a planarization composition in proximity to the interface;
planarizing the Group VIII metal-containing surface;

Amendment and Response

Page 17 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

wherein the planarization composition comprises a complexing agent selected from the group of a cyclic diene, an organic amine, and combinations thereof; [[and]]

wherein the planarization composition further comprises an oxidizing agent in an amount of no more than about 10 wt-%; and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

56-60. (Previously Presented) The method of claim 59 wherein the complexing agent is present in an amount of no greater than about 10 wt-%.

57-61. (Previously Presented) the method of claim 60 wherein the complexing agent is present in an amount of about 0.5 wt-% to about 5 wt-%.

58-62. (Currently Amended) A planarization method comprising:

- positioning a Group VIII metal-containing surface of a substrate to interface with a polishing surface, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;
- supplying a planarization composition in proximity to the interface;
- planarizing the Group VIII metal-containing surface;
- wherein the planarization composition comprises a complexing agent selected from the group consisting of a cyclic diene, an organic amine, ~~an organic chelating acid,~~ and combinations thereof; [[and]]
- wherein the planarization composition further comprises an oxidizing agent in an amount of no more than about 10 wt-%; and
- wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

Amendment and Response

Page 18 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING COMPLEXING AGENTS

59 63. (Previously Presented) The method of claim 62 wherein the oxidizing agent is present in an amount of about 0.1 wt-% to about 1 wt-%.

60 64. (Previously Presented) The method of claim 62 wherein the complexing agent is present in an amount of no greater than about 10 wt-%.

61 65. (Previously Presented) the method of claim 64 wherein the complexing agent is present in an amount of about 0.5 wt-% to about 5 wt-%.

62 66. (Currently Amended) A planarization method comprising:
providing a semiconductor substrate or substrate assembly including at least one region of a platinum-containing surface;
providing a polishing surface;
providing a planarization composition at an interface between the at least one region of platinum-containing surface and the polishing surface; and
planarizing the at least one region of platinum-containing surface;
wherein the planarization composition comprises a complexing agent selected from the group consisting of a cyclic diene, an organic amine, and combinations thereof;
[[and]]
wherein the planarization composition further comprises an oxidizing agent in an amount of no more than about 10 wt-%; and
wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

63 67. (Previously Presented) The method of claim 66 wherein the complexing agent is present in an amount of no greater than about 10 wt-%.

Amendment and Response

Page 19 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING
COMPLEXING AGENTS

64-68. (Previously Presented) the method of claim 67 wherein the complexing agent is present in an amount of about 0.5 wt-% to about 5 wt-%.

65-69. (Currently Amended) A planarization method comprising:

- providing a semiconductor substrate or substrate assembly including at least one region of a platinum-containing surface;
- providing a polishing surface;
- providing a planarization composition at an interface between the at least one region of platinum-containing surface and the polishing surface; and
- planarizing the at least one region of platinum-containing surface;

wherein the planarization composition comprises a complexing agent selected from the group consisting of a cyclic diene, an organic amine, ~~an organic chelating acid~~, and combinations thereof; [[and]]

wherein the planarization composition further comprises an oxidizing agent in an amount of no more than about 10 wt-%; and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

66-70. (Previously Presented) The method of claim 69 wherein the oxidizing agent is present in an amount of about 0.1 wt-% to about 1 wt-%.

67-71. (Previously Presented) The method of claim 69 wherein the complexing agent is present in an amount of no greater than about 10 wt-%.

68-72. (Previously Presented) the method of claim 71 wherein the complexing agent is present in an amount of about 0.5 wt-% to about 5 wt-%.

Amendment and Response

Page 20 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING
COMPLEXING AGENTS

69 73. (Currently Amended) A planarization method for use in forming a capacitor or barrier layer, the method comprising:

providing a semiconductor substrate or substrate assembly having a patterned dielectric layer formed thereon and a Group VIII metal-containing layer formed over the patterned dielectric layer, wherein the Group VIII metal is selected from the group consisting of rhodium, iridium, ruthenium, osmium, palladium, platinum, and combinations thereof;

positioning a first portion of a polishing surface for contact with the Group VIII metal-containing layer;

providing a planarization composition in proximity to the contact between the polishing surface and the Group VIII metal-containing layer; and

planarizing the Group VIII metal-containing layer;

wherein the planarization composition comprises a complexing agent selected from the group consisting of a cyclic diene, an organic amine, and combinations thereof; [[and]]

wherein the planarization composition further comprises an oxidizing agent in an amount of no more than about 10 wt-%; and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, trichthylamine, trimethylamine, and combinations thereof.

70 74. (Previously Presented) The method of claim 73 wherein the complexing agent is present in an amount of no greater than about 10 wt-%.

71 75. (Previously Presented) the method of clam 74 wherein the complexing agent is present in an amount of about 0.5 wt-% to about 5 wt-%.

Amendment and Response

Page 21 of 25

Serial No.: 10/028,040

Confirmation No.: 2997

Filed: December 21, 2001

For: METHODS FOR PLANARIZATION OF GROUP VIII METAL-CONTAINING SURFACES USING
COMPLEXING AGENTS

7276. (Currently Amended) A planarization method for use in forming a capacitor or barrier layer, the method comprising:

providing a semiconductor substrate or substrate assembly having a patterned dielectric layer formed thereon and a platinum-containing layer formed over the patterned dielectric layer;

positioning a first portion of a polishing surface for contact with the platinum-containing layer;

providing a planarization composition in proximity to the contact between the polishing surface and the platinum-containing layer; and

planarizing the platinum-containing layer;

wherein the planarization composition comprises a complexing agent selected from the group consisting of a cyclic diene, an organic amine, an organic chelating acid, and combinations thereof; [[and]]

wherein the planarization composition further comprises an oxidizing agent in an amount of no more than about 10 wt-%; and

wherein the organic amine is selected from the group consisting of ethylamine, methylamine, triethylamine, trimethylamine, and combinations thereof.

7377. (Previously Presented) The method of claim 76 wherein the oxidizing agent is present in an amount of about 0.1 wt-% to about 1 wt-%.

7478. (Previously Presented) The method of claim 76 wherein the complexing agent is present in an amount of no greater than about 10 wt-%.

7579. (Previously Presented) the method of claim 78 wherein the complexing agent is present in an amount of about 0.5 wt-% to about 5 wt-%.